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season in the Wichita Mountains, but permission to enter the Kiowa reservation, in which the mountains are situated, not having been granted, the plan of the route was changed. From Norman, the seat of the university, the party went north to Perry and Stillwater, then west across the northern part of the Territory as far as Camp Supply, south to the Washita river, and east through Norman, across the Seminole and Creek reservations to Okmulgee, north past the Tulsa coalfields, through the Cherokee and Osage nations to the Kansas line and south again to Norman. In all about 1,500 miles were covered and every county in Oklahoma except three were visited.

Although the trip was of necessity little more than a reconnaissance, still the work as a whole was most satisfactory. The Red-beds—one of the most vexing of western geological groups—were studied throughout the Territory. Three large salt plains were visited; the ledge of gypsum which extends from Kansas to Texas was traced and mapped for several hundred miles; fossils were collected from five different localities representing as many horizons in the Red-beds. Numerous outcrops of *comanche* Cretaceous fossils were located in the western part of the Territory. Collections of considerable importance were made in the various formations, and the fossils are now being worked up in the Museum of the University. When these shall have been identified it is hoped that the question of the age of the Red-beds will be definitely settled. In the eastern part of the Territory the relation of the coal and oil fields of the Carboniferous to the Red-beds was investigated. Throughout the trip the question of water supply was given considerable attention.

Dr. Van Vleet made good collections of the animal life of the region, paying particular attention to snakes and birds. Mr. White's large collection of plants is of

much interest in that it comprises several species that are probably new to science.

Mr. Hadsell devoted much time to collecting historical data, particularly that pertaining to Indians and old government trails and forts. About 150 photographs were taken illustrating the various phases of the work.

A report of the progress of the survey will be presented to the Governor before the meeting of the next Legislature. In addition, a number of short articles will be written setting forth the work in greater detail. It is confidently hoped that legislative appropriation will be sufficient to enable much more effective work in the future.

CHARLES NEWTON GOULD.

THE UNIVERSITY OF OKLAHOMA,
Sept. 18, 1900.

MOSQUITOES OF THE UNITED STATES.

For many years a few medical men have nursed the theory that mosquitoes may be carriers from man to man of the germs of human malaria. Quite recently physicians have produced evidence that makes this no longer a theory but a demonstrated fact. The result is that there is a great demand in all civilized countries for information regarding mosquitoes. This demand found the entomologists of the world illy prepared with definite facts about the lives and habits of the different kinds of mosquitoes. It was not until 1896 that any thoroughly satisfactory figure of a well-determined species of mosquitoes from the United States, or any account of its early stages, was to be found in the literature. Then Dr. L. O. Howard, U. S. Entomologist, published (Bull. 4, New Series, U. S. Div. of Entomology) a full and carefully illustrated account of *Culex pungens*, and also included a digest of his previous articles on remedies for mosquitoes and a tabulated statement regarding the different species in this

country. Continuing the work so well begun, Dr. Howard made further important studies of mosquitoes, which he has embodied in Bulletin No. 25, New Series, U. S. Div. of Entomology, 70 pages, entitled 'Notes on the Mosquitoes of the United States, giving some account of their structure and biology, with remarks on remedies,' which was issued early in September. Some of these 'notes' are of a monographic nature.

Under the first heading, 'On mosquitoes in general,' are given interesting accounts of the excessive abundance in which mosquitoes have occurred in ancient and modern times, even in extreme northern latitudes. The length of life of the adult mosquito may vary from a few days in confinement to months when in hibernation; a brief general statement of the life-history of mosquitoes is given; in relation to the food of adult mosquitoes, it is stated that the male does not necessarily take nourishment, but they have been seen sipping at drops of water, molasses and beer, while one instance is given where they were made drunk with wine; the females are believed to be normally plant feeders, less than one in a million ever getting the opportunity to taste the blood of a warm-blooded animal. Evidence is submitted to show that mosquitoes do not fly far and also that they are not liable to be carried by strong winds, but railway trains are apparently important means of transporting unlimited quantities of them for unlimited distances. Many believe that mosquito larvæ can live for a considerable period in mud or dried up pools, but the evidence submitted indicates that when the mud dries up entirely the larvæ are necessarily killed. The world's mosquito fauna, as far as known, comprises about 250 species, of which only about 30 have been found in the United States, these representing 5 different genera.

Upon the very important and interesting

topic of 'mosquitoes and malaria,' I think more should have been said in such a combined popular and scientific bulletin. A brief and popular abstract of Major Ross' intensely interesting article, only cited, would have been welcomed by many readers who, like myself, have not been able to follow closely the trend of recent scientific discovery in this all-important field. It is stated that there is now 'very perfect proof that mosquitoes may and do transfer the malaria germ from a malaria patient and deposit it in the blood of a healthy person'; only the mosquitoes of the genus *Anopheles* have been found to contain the human blood parasites, but apparently no other genera except *Culex* have been investigated, and our southern physicians are advised to study the very large mosquitoes of two genera occurring there from the malarial standpoint.

'Synoptic tables of the North American mosquitoes' are next given. I doubt if more suggestive scientific names occur in any other group of insects; for instance: *excitants*, *stimulans*, *pungens*, *perturbans*, *excrucians*, *provocans*, *impatiens*, *punctor*, and *damnosus*.

The bulletin is teeming with original observations and experiments, especially in relation to the biology of *Culex pungens* and *Anopheles quadrimaculatus* and remarks upon other species and their general distribution in the United States. Detailed accounts of the life-histories and habits of these two species are given and illustrated by remarkably accurate and instructive figures of all stages and many details of structure; no such thorough and excellent account of any of the species of mosquitoes, especially of the very important malaria-carrying genus *Anopheles*, has before found its way into the world's literature. Such painstaking work deserves the highest commendation and it is a pleasure to credit it to our worthy official entomologist at Washington. It is shown that the different stages and

habits of *Anopheles* mosquitoes are quite different from those of the genus *Culex*, and the figures illustrating the differences are very instructive. *Anopheles* larvæ inhabit mostly 'fairly permanent stagnant pools of water uninhabited by fish, but more or less covered with green scum.' Many other important and interesting new facts recorded in this portion of the bulletin cannot be mentioned in this brief review.

The three other genera of mosquitoes, *Psorophora*, *Megarhinus* and *Aedes*, found in the United States, are briefly discussed and the adult of one species in each genus is figured. The natural enemies of mosquitoes, such as dragon flies, water beetles larvæ, fish and birds, are succinctly discussed.

Nearly 16 pages of the bulletin are devoted to what is undoubtedly the best and fullest discussion of 'remedies against mosquitoes' in entomological literature. Dr. Howard's previous articles on the kerosene treatment of breeding places are condensed, and many suggestions from experience and from published records for preventing and alleviating mosquito bites are included. The effective methods of destroying the larvæ by the use of kerosene on the water, the proper drainage of the land, the practical use of fish, the agitation of the infested water are discussed in detail. Other unsuccessful experiments with larvicides, such as permanganate of potash and several proprietary mixtures are recorded. A most extensive series of experiments with culicidal mixtures made in Italy are briefly abstracted, and unsatisfactory experiments with tar and its compounds are given in detail. Some strong evidence is given to show that eucalyptus trees are valuable malarial deterrents. Still more evidence may be found in the writings of forestry experts who think that the planting of these trees in suitable regions may accomplish wonderful results in reducing malaria

either by drainage of the soil or by modifying the water so as to render it uninhabitable for mosquitoes. While it is true that the planting of eucalyptus trees is not a sovereign remedy, as Dr. Nuttall points out, for malaria still prevails at Tre Fontane, outside of Rome, in spite of the planting of these trees, I am told by a forestry expert who has visited this place that before the plantings it was utterly uninhabitable, while now monks and workmen live there, and malaria is much reduced.

The bulletin closes with a strong plea for 'drainage and community work,' and striking instances are given where wonderful results have been attained.

In an appendix is given a translation of Meinert's brief, earlier account of the larva of *Anopheles*, and several paragraphs of a very important report of the Malarial Expedition of the Liverpool School of Tropical Medicine which was received too late to incorporate in the body of the bulletin. In this latter report are recorded many important observations on the bionomics of *Anopheles* larvæ and adults.

From a popular, biologic or scientific standpoint, this bulletin on mosquitoes is a very important, instructive, interesting and useful addition to the world's entomological literature.

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SCIENTIFIC BOOKS.

The Norwegian North Polar Expedition, 1893-1896. Scientific Results. Edited by FRIDTJOF NANSEN. New York, Longmans, Green & Co. 1900. 4to. Pp. viii + 379, 46 plates.

In this sumptuous volume we have the first instalment of the scientific results of the celebrated North Polar expedition led by Dr. Nansen. The series is intended to contain a complete account of the scientific harvest of the expedition, and will doubtless form the standard work of reference for all scientific data of the North Polar basin for many years